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Dynamical transport in correlated quantum dots: a renormalization-group analysis

S. Andergassen
RWTH, Aachen,Germany.
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We present results for the nonlinear transport and the time evolution into the stationary state for two minimal models for quantum dots: the interacting resonant level model describing a dot dominated by charge fluctuations, and the Kondo model for a dot with spin fluctuations. Using recently developed renormalization-group approaches in non-equilibrium, the analytical solution of the corresponding flow equations allows to identify the microscopic cutoff scales that determine the relaxation and decoherence rates. Exploring the entire parameter space we find rich non-equilibrium physics which cannot be understood by simply considering the bias voltage as an infrared cutoff. The relaxation dynamics towards the steady state features characteristic voltage-dependent oscillations as well as an interplay of exponential and power-law decay.